

## \_\_\_\_\_ ADMIXTURES

a. General. - The Contractor shall furnish <sup>1</sup>(air-entraining and chemical admixtures) for use in concrete. Admixtures shall be of uniform consistency, quality, and strength of solution. Admixtures shall be batched separately in liquid form in dispensers capable of measuring at one time the full quantity of each admixture required for each batch. Measurement shall be either by weighting or by volumetric admixture dispensers constructed and located such that the full batch quantity of each admixture can be observed in a visual gauge by the plant operator. Each admixture <sup>2</sup>(, except calcium chloride,) shall be discharged separately into the mixing water as the water is being discharged into the mixer. <sup>2</sup>(Calcium chloride solution shall be added directly from the visual dispenser to the mixer concurrently with the addition of mix water.)

The Contractor shall notify the <sup>1</sup>[(Project) Construction Engineer], in writing, of the manufacturers and specific brand names, including ASTM designation and type, of all admixtures to be used.

The Contractor shall submit the manufacturer's product description, instructions, recommended dosage, chloride content, and precautions to be considered when using the admixture. In addition, independent laboratory test data, confirming that the requirements of the applicable ASTM standard have been met, shall be submitted to the Government unless the admixture has been used previously by the Government and found to conform to specifications requirements. These submittals shall be submitted in accordance with this paragraph and paragraph \_\_\_\_\_ <sup>3</sup>(Submittal Requirements)z. For assistance locating a supplier, the contractor may contact the Bureau of Reclamation Materials Engineering and Research Group.

Final approval of an admixture will not be given until it has performed satisfactorily at the jobsite.

b. Chemical admixtures. - Chemical admixtures which will introduce more than 1/10 of 1 percent chloride, by weight of <sup>1</sup>(cement,) (cementitious materials,) shall not be used in concrete for bridge decks or in concrete in which aluminum, galvanized metalwork, or prestressing steel is to be embedded.

(1) Accelerator. - <sup>4</sup>[The Contractor may use an accelerating admixture in concrete when the mean daily temperature in the vicinity of the placement has been less than 5 EC (41 EF) for 2 of the 4 days prior to placement. Accelerating admixture shall not be used in less severe weather except upon written approval by the Contracting Officer. Request for such approval shall state the reason for using accelerator, the amount and brand of accelerator to be used, and the location of the concrete in which the Contractor proposes use of the accelerator.

The accelerator shall conform to ASTM designation: C 494 for type C or E chemical admixtures. The amount of accelerator used <sup>2</sup>(, except for calcium chloride,) shall be that amount necessary to effect the requirements of ASTM designation: C 494. The Contracting Officer reserves the right to adjust quantities of accelerator used, depending on climatic and other job conditions, and the Contractor shall be entitled to no additional compensation for such adjustment. For assistance locating a supplier, the contractor may contact the Bureau of Reclamation Materials Engineering and Research Group.

<sup>2</sup>(Calcium chloride used as an accelerator shall meet requirements of ASTM designation: D 98 and shall be no coarser than grade A, class 1 or shall be liquid. The calcium chloride shall be batched in liquid form, in solution with water, to include 1 percent calcium chloride, by weight of <sup>1</sup>(cement,) (cementitious materials,) in the concrete mix. The Contractor may request approval by the Contracting Officer for use of a larger amount of calcium chloride, not to exceed 2 percent, by weight of <sup>1</sup>(cement,) (cementitious materials,) during especially severe (weather.)) For assistance locating a supplier, the contractor may contact the Bureau of Reclamation Materials Engineering and Research Group.

<sup>5</sup>(Accelerating admixtures shall not be used in the concrete.)

(2) Water reducing and/or set controlling. - The Contractor <sup>6</sup>(shall) (may) use a water-reducing and/or set-controlling admixture, referred to herein as WRA, in all concrete. The admixture shall conform to ASTM designation: C 494 for type A, F, or G chemical admixture <sup>7</sup>(except that type E chemical admixture meeting ASTM requirements will also be an acceptable WRA only during cold weather). For assistance locating a supplier, the contractor may contact the Bureau of Reclamation Materials Engineering and Research Group.

<sup>8</sup>(If use of the WRA chosen by the Contractor is accompanied by abnormal setting of the fresh concrete, or if the WRA does not perform in accordance with these specifications, the Contractor shall furnish and use other brands of WRA until an acceptable admixture is found.)

Normally the amount of WRA used shall be that amount necessary to effect the requirements of ASTM designation: C 494. However, the Contracting Officer reserves the right to adjust the quantities of WRA or eliminate its use, and the Contractor shall be entitled to no additional allowances for such adjustments. For assistance locating a supplier, the contractor may contact the Bureau of Reclamation Materials Engineering and Research Group.

c. Air-entraining admixture. - An air-entraining admixture shall be used in all concrete. The admixture shall conform to ASTM designation: C 260: Provided, That air-entraining admixture used with type F or G chemical admixture shall be a neutralized vinsol resin formulation.

The amount of air-entraining admixture used shall be that amount necessary to effect a total air content in the concrete at the placement as shown in table \_\_\_\_\_ (Total air content). For assistance locating a supplier, the contractor may contact the Bureau of Reclamation Materials Engineering and Research Group.

Table \_\_\_\_\_. - Total air content

Nominal maximum size coarse aggregate	Total air, percent by volume of concrete
3/4 inch	6 plus or minus 1
1-1/2 inches	4.5 plus or minus 1
3 inches	3.5 plus or minus 1

d. Cost. - The cost of furnishing admixtures and all other costs incidental to their use shall be included in the applicable price bid in the schedule for the concrete in which the admixtures are used.

<sup>1</sup>Delete or revise as required.

<sup>2</sup>Delete if type V cement is specified or if calcium chloride will otherwise be prohibited.

<sup>3</sup>D-1511 is the responsible code.

<sup>4</sup>If type V cement is specified or if accelerator is not to be used due to mild climate or any other reason, delete this paragraph.

<sup>5</sup>Delete if accelerating admixtures will be permitted.

<sup>6</sup>When less than 2,000 cubic yards of cast-in-place concrete is to be included in the work, or where large quantities of concrete are in small scattered features such as transmission line footings and lateral structures, use the word "may." Otherwise use the word "shall."

<sup>7</sup>Delete if accelerator is not to be used.

<sup>8</sup>Delete if use of WRA is optional.

<sup>9</sup>Delete if 3-inch maximum size aggregate is not specified.

8-1-87 Revisions: Revised subparagraph a.